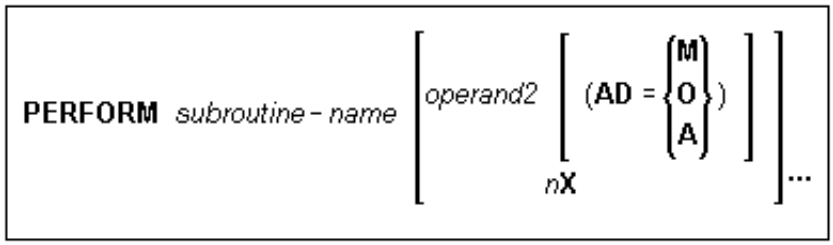
PERFORM



Operand	Possible Structure					Possible Formats												Referencing Permitted	Dynamic Definition
Operand2	C	S	A	G		A	N	P	I	F	B	D	T	L	C	G	O	yes	yes

Related Statements: DEFINE SUBROUTINE | DEFINE DATA PARAMETER | CALLNAT | FETCH

Function

The PERFORM statement is used to invoke a Natural *subroutine*.

subroutine-name

For a subroutine name (maximum 32 characters), the same naming conventions apply as for user-defined variables (see the Natural Reference documentation).

The subroutine name is independent of the name of the module in which the subroutine is defined (it may but need not be the same).

The subroutine to be invoked must be defined with a DEFINE SUBROUTINE statement. It may be an inline or external subroutine (see DEFINE SUBROUTINE statement).

Within one object, no more than 50 external subroutines may be referenced.

Data Available in a Subroutine

Inline Subroutines

No explicit parameters can be passed from the invoking object to an inline subroutine.

An inline subroutine has access to the currently established global data area as well as the local data area defined within the same object module.

External Subroutines

An external subroutine has access to the currently established global data area. Moreover parameters can be passed with the PERFORM statement from the invoking object to the external subroutine (*see operand2*); thus, you may reduce the size of the global data area.

Parameters - operand2

When an *external* subroutine is invoked with the PERFORM statement, one or more parameters (*operand2*) can be passed with the PERFORM statement from the invoking object to the external subroutine. For an *inline* subroutine, *operand2* cannot be specified.

If parameters are passed, the structure of the parameter list must be defined in a DEFINE DATA statement.

By default, the parameters are passed "by reference", that is, the data are transferred via address parameters, the parameter values themselves are not moved.
However, it is also possible to pass parameters "by value", that is, pass the actual parameter values. To do so, you define these fields in the DEFINE DATA PARAMETER statement of the subroutine with the option BY VALUE or BY VALUE RESULT.

- If parameters are passed "by reference" the following applies: The sequence, format and length of the parameters in the invoking object must match exactly the sequence, format and length of the DEFINE DATA PARAMETER structure of the invoked subroutine. The names of the variables in the invoking object and the subroutine may be different.
- If parameters are passed "by value" the following applies: The sequence of the parameters in the invoking object must match exactly the sequence in the DEFINE DATA PARAMETER structure of the invoked subroutine. Formats and lengths of the variables in the invoking object and the subroutine may be different; however, they have to be data transfer compatible. The names of the variables in the invoking object and the subroutine may be different.
  If parameter values that have been modified in the subroutine are to be passed back to the invoking object, you have to define these fields with BY VALUE RESULT.
  With BY VALUE (without RESULT) it is not possible to pass modified parameter values back to the invoking object (regardless of the AD specification; see also below).

Note:
With BY VALUE, an internal copy of the parameter values is created. The subroutine accesses this copy and can modify it, but this will not affect the original parameter values in the invoking object.
With BY VALUE RESULT, an internal copy is likewise created; however, after termination of the subroutine, the original parameter values are overwritten by the (modified) values of the copy.

For both ways of passing parameters, the following applies:

In the parameter data area of the invoked subroutine, a redefinition of groups is only permitted within a REDEFINE block.

If an array is passed, its number of dimensions and occurrences in the subroutine’s parameter data area must be same as in the PERFORM parameter list.

Note:
If multiple occurrences of an array that is defined as part of an indexed group are passed with the PERFORM statement, the corresponding fields in the subroutine’s parameter data area must not be redefined, as this would lead to the wrong addresses being passed.

AD=

If operand2 is a variable, you can mark it in one of the following ways:

AD=O	non-modifiable
AD=M	modifiable
AD=A	input only

The default setting for AD= is AD=M.

If *operand2* is a constant, AD cannot be explicitly specified. For constants AD=O always applies.

AD=M

By default, the passed value of a parameter can be changed in the subroutine and the changed value passed back to the invoking object, where it overwrites the original value.

Exception: For a field defined with BY VALUE in the subroutine's parameter data area, no value is passed back.

AD=O

If you mark a parameter with AD=O, the passed value can be changed in the subroutine, but the changed value cannot be passed back to the invoking object; that is, the field in the invoking object retains its original value.

Note:
Internally, AD=O is processed in the same way as BY VALUE (see note under Parameters - operand2).

AD=A

If you mark a parameter with AD=A, its value will not be passed **to** the subroutine; it will be reset to empty before the subroutine is invoked, and can be used to receive a value **from** the subroutine.

For a field defined with BY VALUE in the subroutine's parameter data area, the invoking object cannot receive a value. In this case, AD=A only causes the field to be reset to empty before the subroutine is invoked.

*n*X

Note:
This notation is not available on mainframe computers.

With the notation *n*X you can specify that the next *n* parameters are to be skipped (for example, 1X to skip the next parameter, or 3X to skip the next three parameters); this means that for the next *n* parameters no values are passed to the external subroutine.
A parameter that is to be skipped must be defined with the keyword OPTIONAL in the subroutine's DEFINE DATA PARAMETER statement. OPTIONAL means that a value can - but need not - be passed from the invoking object to such a parameter.

Nested PERFORM Statements

The invoked subroutine may contain a PERFORM statement to invoke another subroutine (the number of nested levels is limited by the size of the required memory).

A subroutine may invoke itself (recursive subroutine). If database operations are contained within an external subroutine that is invoked recursively, Natural will ensure that the database operations are logically separated.

Parameter Transfer with Dynamic Variables

See CALLNAT

Example 1

```
/* EXAMPLE 'PEREX1S': PERFORM (STRUCTURED MODE)
/*****************************************
DEFINE DATA LOCAL
1 EMPLOY-VIEW VIEW OF EMPLOYEES
  2 NAME
  2 ADDRESS-LINE  (A20/2)
  2 PHONE
1 #ARRAY (A75/1:4)
1 REDEFINE #ARRAY
  2 #ALINE  (A25/1:4,1:3)
1 #X (N2) INIT <1>
1 #Y (N2) INIT <1>
END-DEFINE
/*****************************************
LIMIT 5
FIND EMPLOY-VIEW WITH CITY = 'BALTIMORE'
 MOVE NAME            TO #ALINE (#X,#Y)
 MOVE ADDRESS-LINE(1) TO #ALINE (#X+1,#Y)
 MOVE ADDRESS-LINE(2) TO #ALINE (#X+2,#Y)
 MOVE PHONE           TO #ALINE (#X+3,#Y)
 IF  #Y = 3
  RESET INITIAL #Y
  PERFORM PRINT
 ELSE
  ADD 1 TO #Y
 END-IF
 AT END OF DATA
  PERFORM PRINT
 END-ENDDATA
END-FIND
/*****************************************
DEFINE SUBROUTINE PRINT
  WRITE NOTITLE (AD=OI) #ARRAY(*)
  RESET #ARRAY(*)
  SKIP 1
END-SUBROUTINE
/*****************************************
END
```

```
JENSON                  LAWLER                  FORREST
2120 HASSELL            4588 CANDLEBERRY AVE    37 TENNYSON DRIVE
#206                    BALTIMORE               BALTIMORE
(301)998-5038           (301)629-0403           (301)881-3609

ALEXANDER               NEEDHAM
409 SENECA DRIVE        12609 BUILDERS LANE
BALTIMORE               BALTIMORE
(301)345-3690           (301)641-9789
```


Example 2

Program containing PERFORM statement:

```
/* EXAMPLE 'PEREX2' PERFORM EXTERNAL WITH PARAMETER
/*****************************************
DEFINE DATA LOCAL
1 EMPLOY-VIEW VIEW OF EMPLOYEES
  2 NAME
  2 ADDRESS-LINE  (A20/2)
  2 PHONE
1 #ALINE  (A25/1:4,1:3)
1 #X (N2) INIT <1>
1 #Y (N2) INIT <1>
END-DEFINE
/*****************************************
LIMIT 5
FIND EMPLOY-VIEW WITH CITY = 'BALTIMORE'
 MOVE NAME            TO #ALINE (#X,#Y)
 MOVE ADDRESS-LINE(1) TO #ALINE (#X+1,#Y)
 MOVE ADDRESS-LINE(2) TO #ALINE (#X+2,#Y)
 MOVE PHONE           TO #ALINE (#X+3,#Y)
 IF  #Y = 3
  DO
   RESET INITIAL #Y
   PERFORM PEREX2E #ALINE(*,*)
  DOEND
 ELSE
  ADD 1 TO #Y
 AT END OF DATA
  PERFORM PEREX2E #ALINE(*,*)
LOOP
/*****************************************
END
```

Invoked Subroutine:

```
/* EXAMPLE 'PEREX2E' SUBROUTINE WITH PARAMETER
/*****************************************
DEFINE DATA PARAMETER
1 #ALINE  (A25/1:4,1:3)
END-DEFINE
/*****************************************
DEFINE SUBROUTINE PEREX2E
 WRITE NOTITLE (AD=OI) #ALINE(*,*)
 RESET #ALINE(*,*)
 SKIP 1
RETURN
/*****************************************
END
```



```
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